EXPERIMENTAL DETERMINATION OF THE BINDING ENERGIES OF THE T-SHAPED AND LINEAR ISOMERS OF THE Ne$\cdots$ICl(X,v''=0) VAN DER WAALS COMPLEX

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Multiple features associated with transitions of the near T-shaped and linear Ne$\cdots$I^{35,37}Cl(X,v''=0) isomers are observed in laser-induced fluorescence spectra recorded in the ICl $B-X$, $2-0$ and $3-0$ spectral regions. The T-shaped complexes access the lowest intermolecular vibrational level within the Ne + ICl(B,v') potential, while the linear complexes access at least four different bending levels that are delocalized in the angular coordinate. The ground state binding energy of the linear Ne$\cdots$I^{35}Cl isomer is directly measured in two-laser, action spectroscopy experiments. A continuum signal is observed with a turn on at 17 748.4 cm^{-1} that indicates a binding energy of 84.3(2.3) cm^{-1} for the ground state complex. The ground state binding energy of the T-shaped isomer can be estimated by fitting the Ne$\cdots$I^{35}Cl(B,v'=2) bending levels that the ground state linear isomer accesses to an ω_e, $\omega_e\chi_e$ progression. The fit reveals a binding energy of 60.8(3.2) cm^{-1} for Ne$\cdots$I^{35}Cl(B,v'=2), which implies a T-shaped ground state binding energy of 66.2(3.2) cm^{-1} based upon the spectroscopic shift of the T-shaped feature from the I^{35}Cl $B-X$, $2-0$ transition. Two-laser, pump-probe experiments were also performed to access the intermolecular vibrational levels that are bound within the Ne + ICl(E 0^+,v=10) ion-pair state. In these experiments, the pump laser was fixed on either the lowest energy level, with a T-shaped equilibrium geometry, or one of the higher energy delocalized levels within the Ne + I^{35}Cl(B,v'=2) well. In this manner, varying Ne$\cdots$I^{35}Cl Franck-Condon windows between the B and E states are accessed and assignments of the intermolecular vibrational levels within the ion-pair state can be made. The results suggest a Ne + ICl(E 0^+) potential with the lowest bound level localized in the T-shaped orientation and that the higher energy levels are delocalized in the angular coordinate.